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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/882,719	06/15/2001	Robert Joseph Bouchard	CL1673 US NA	1392

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EXAMINER

MACCHIAROLO, PETER J

ART UNIT PAPER NUMBER

2875

DATE MAILED: 02/28/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/882,719

Applicant(s)

BOUCHARD ET AL.

Examiner

Peter J Macchiarolo

Art Unit

2875

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 December 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-53 is/are pending in the application.
- 4a) Of the above claim(s) 18-23 and 40-53 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-6, 8-17, 24-27 and 29-39 is/are rejected.
- 7) ☐ Claim(s) 7 and 28 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 02 January 2002 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☒ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 7, 8, 9, 13.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Election/Restrictions

1. Restriction to one of the following inventions is required under 35 U.S.C.121:
 - I. Claims 1-17 and 24-39 are drawn to a process of manufacturing an electron field emitter, classified in class 445, subclass 50.
 - II. Claims 18-23, drawn to a composition, classified in class 252, subclass 510.
 - III. Claims 44-53, drawn to a process of manufacturing an electrical device, classified in class 430, subclass 311.
 - IV. Claims 40-43 are drawn to a process of manufacturing an electron field emitter with a start up, flashing, or aging, classified in class 445, subclass 6.
2. The inventions are distinct, each from the other because of the following reasons:
 - a. Inventions of Group I and Group II are unrelated. Inventions are unrelated if it can be shown that they are not disclosed as capable of use together and they have different modes of operation, different functions, or different effects (MPEP § 806.04, MPEP § 808.01). In the instant case the different inventions are unrelated because the process of manufacturing an electron field emitter and the composition have different modes of operation and have different effects.
 - b. Further, inventions of Group I and Group III are unrelated. Inventions are unrelated if it can be shown that they are not disclosed as capable of use together and they have different modes of operation, different functions, or different effects (MPEP § 806.04,

MPEP § 808.01). In the instant case the different inventions are unrelated because the different methods of manufacturing cannot be used together and have different effects.

c. Further, inventions of Group I and Group IV are unrelated. Inventions are unrelated if it can be shown that they are not disclosed as capable of use together and they have different modes of operation, different functions, or different effects (MPEP § 806.04, MPEP § 808.01). In the instant case the different inventions are unrelated because the different methods of manufacturing cannot be used together and have different effects.

Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

3. During a telephone conversation with John Langworthy on February 20, 2003, a provisional election was made **without** traverse to prosecute the invention of a process of manufacturing an electron field emitter according to claims 1-17 and 24-39. Affirmation of this election must be made by applicant in replying to this Office action. Claims 18-23, 40-43, and 44-53 are withdrawn from further consideration by the Examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Priority

4. The Examiner acknowledges the continuing data from provisional applications 60/213,002 filed June 21, 2000; 60/213,159 filed June 22, 2000; and 60/287,930 filed May 1, 2001.

Oath/Declaration

5. The oath or declaration is defective. A new oath or declaration in compliance with 37 CFR 1.67(a) identifying this application by application number and filing date is required. See MPEP §§ 602.01 and 602.02.

The oath or declaration is defective because it does not identify the mailing or post office address of each inventor. A mailing or post office address is an address at which an inventor customarily receives his or her mail and may be either a home or business address. The mailing or post office address should include the ZIP Code designation. The mailing or post office address may be provided in an application data sheet or a supplemental oath or declaration. See 37 CFR 1.63(c) and 37 CFR 1.76.

Specification

6. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Drawings

7. The drawings are objected to because the Applicant has submitted two figures titled "Fig. 8e." The Examiner is interpreting this to be a typographical error and the second Fig. 8e should read "Fig. 8f." However, a proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Objections

8. Claims 2, and 25-27 are objected to because of the following informalities:

Claim 2 recites the "...material is separated from said electron field emitter a portion of said electron..." The Examiner is interpreting the limitation to read, "...material is separated from said electron field emitter and a portion of said electron..."

Claims 25 and 26 recite an electron field emitter "comprised of carbon carbon nanotubes." The Examiner is interpreting the repeated word "carbon" to be a typographical error.

Claim 27 depends on any one of claims 45 or 8-11. However, the Examiner is interpreting "45" to be a typographical error of --4--.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

9. The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) do not apply to the examination of this application as the application being examined was not (1) filed on or after November 29, 2000, or (2) voluntarily published under 35 U.S.C. 122(b). Therefore, this application is examined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

10. Claims 1, 2, 13-15, 24, 29-30, and 34 are rejected under 35 U.S.C. 102(e) as being anticipated by Nakamoto (USPN 6,097,138; "Nakamoto").

In regards to claims 1, 24, and 34 Nakamoto discloses a method for improving the field emission of an electron field emitter in figures 6A-6D. The method comprises contacting a material (44) with the electron field emitter (42 and 26) and the material forms an adhesive contact with the electron field emitter. The adhesive force is such that when the material is separated from the electron field emitter, a portion of the electron field emitter (26) is removed, thereby forming a new surface of the electron field emitter. Nakamoto further discloses in figures 6A-6D that the material is separated from the electron field emitter:

In regards to claims 13 and 2, Nakamoto discloses a process for improving the field emission of an electron field emitter in figures 6A-6D. The process comprises applying a force to the surface of the electron field emitter (42 and 26) in a direction essentially normal to the

plane of the electron field emitter wherein the force results in the removal of a portion of the electron field emitter thereby forming a new electron field emitter surface.

In regards to claims 14, 15, 29, and 30, Nakamoto discloses all of the recited limitations of claim 13 (above).

Nakamoto further discloses in the abstract and in column 2 lines 23-25, that the acicular carbon is comprised of carbon nanotubes, and this configuration increases the field emission efficiency and reduces the consumption power.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

12. Claims 2-4, 25-27, 31-32, 35-36, and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakamoto (USPN 6,097,138; "Nakamoto").

In regards to claims 2-4, 25-27, 31-32, 35-36, and 38, Nakamoto discloses in figures 6A-6D that the material is separated from the electron field emitter. Nakamoto further teaches in the abstract and in column 2 lines 23-25, that the acicular carbon is comprised of carbon nanotubes, and this configuration increases the field emission efficiency and reduces the consumption power.

Nakamoto is silent to a portion of the electron field emitter being removed from the material when the material is separated from the electron field emitter.

However, it is well known in the art that a portion of the electron field emitter will be removed from the material when the material is separated from the electron field emitter.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the method of Nakamoto to improve the field emission of an electron filed emitter, including removing a portion of the electron filed emitter from the material when they are separated, since it is well known in the art that a portion of the electron field emitter will be removed from the material when the material is separated from the electron field emitter, and this configuration increases the field emission efficiency and reduces the consumption power.

13. Claims 5-6, 16-17, 33, 37, and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakamoto (USPN 6,097,138; "Nakamoto") in view of Bower et al (USPN 6,277,318 "Bower").

In regards to claims 5-6, 16-17, 33, 37, and 39 Nakamoto teaches all of the recited limitations of claims 4 and 15 (above).

Nakamoto is silent to the carbon nanotubes being single walled carbon nanotubes.

However, Bower teaches in column 3 lines 43-60, that single wall carbon nanotubes which are grown using laser ablation are used. Bower further teaches in column 1 lines 49-52, that this configuration allows for the formation of more useful and robust device structures.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the method of Nakamoto to improve the field emission of an electron filed emitter, including Bower's nanotubes, since bower teaches this configuration allows for the formation of more useful and robust device structures.

14. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Zettl et al (USPN 6,057,637; "Zettl").

In regards to claim 12, Zettl discloses in figures 1a-1c, a process for improving the filed emission of an electron field emitter, comprised of an acicular emitting substance (13). Zettl further teaches in column 5 lines 45-55, that the emitters can be pressed in a direction essentially normal to the plane of the electron field emitter for some materials such as Teflon and soft metals, thereby forming a new surface of the electron field emitter, and this process is simple.

Zettl is silent to the force resulting in fractures of the electron field emitter.

However, it is well known in the art that the force necessary to perform this particular process is sufficient to fracture some of the nanotubes in the acicular emitting substance.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the method of Zettl to improve the field emission of an electron filed emitter, including using a force resulting in fractures of the electron field emitter, since Zettl teaches this process is simple, and therefore less expensive.

15. Claims 8-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakamoto (USPN 6,097,138; "Nakamoto") in view of Bower et al (USPN 6,277,318 "Bower") in further view of Kim et al (USPN 6,146,230; "Kim").

In regards to claims 8-11, Nakamoto and Bower teach all of the recited limitations of claim 5 (above).

Both Nakamoto and Bower are silent to the exact percent weight of the nanotubes.

However, Kim teaches in column 3 lines 29-37, that a preferable amount of electron emitting carbon nanotubes is 1 to 50 wt %. Kim further teaches that when the nanotubes are less than 1 wt %, the electrons are rarely emitted from the material, and when the amount of the electron emitting material exceeds 50 wt %, manufacturing becomes difficult.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the method of Nakamoto to improve the field emission of an electron filed emitter, including Bower's nanotubes, further including Kim's percent weight, since Kim teaches when the nanotubes are less than 1 wt %, the electrons are rarely emitted from the material, and when the amount of the electron emitting material exceeds 50 wt %, manufacturing becomes difficult.

Conclusion

16. Claims 7 and 28 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

17. The following is a statement for allowable subject matter:

The best prior art of record does not motivate or disclose a process for improving the field emission of an electron field emitter with carbon nanotubes that were grown from the catalytical decomposition of carbon-containing gases over small metal particles, and each of the fibers having graphene platelets arranged at an angle with respect to the fiber axis so that the periphery of the carbon fiber consists essentially of the edges of the graphenes planes.

18. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

Chang et al (USPN 6,436,221; filed February 7, 2001; "Chang") discloses a process for improving a field emission of an electron field emitter, which is extremely similar to Applicant's. However, Chang's filing date falls after Applicant's priority date, and is therefore not relied upon in this office action.

Jin et al (USPN 6,250,984; filed January 25, 1999) also discloses a process for improving a field emission of an electron field emitter, which is extremely similar to Applicant's. However, Jin uses etching to uncover the carbon nanotubes and is therefore not relied upon in this office action.

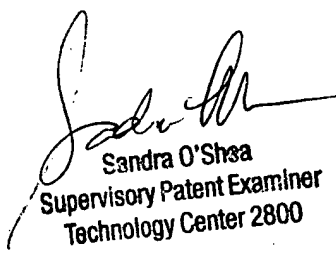
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19. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Peter J Macchiarolo whose telephone number is (703) 305-7198. The examiner can normally be reached on 8 - 4:30, M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sandra O'Shea can be reached on (703) 305-4939. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9318 for regular communications and (703) 872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

pjm
February 21, 2003



Sandra O'Shea
Supervisory Patent Examiner
Technology Center 2800